TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE · · FOREST SERVICE

No. 625

Snow Damage Is Correlated With Stand Density in Recently Thinned Jack Pine Plantations

Most Lake States plantation species are resistant to snow damage; but an exceptionally heavy, wet snowfall may cause severe damage to a jack pine plantation that has been recently thinned. These storms occur infrequently and jack pine stands tend to become less susceptible to damage within a few years after thinning.[1/] However, the possibility of heavy storms and the severe damage they can cause should be considered in the initial thinning of a stand.

In April, 1961, a storm damaged two southwestern Michigan jack pine plantations containing experimental cuttings. Only one growing season had elapsed since the plantations were thinned in a number of different treatments. The treatments are described below, and the types and intensity of damage inflicted in the various treatment areas are discussed.

Two 24-year-old jack pine plantations on the Allegan State Forest in Allegan County were thinned in the fall of 1959. Both stands were on good sites, averaging slightly under 120 square feet of basal area per acre before thinning. The average stand diameter was 4.8 inches. The stands were thinned to leave 30, 60, 90, and 120 square feet per acre on 0.4-acre cutting compartments. Thinning was primarily from below, but only trees 4.0 inches and larger were removed.

Additional plots were left for later thinning to higher densities as the stand develops. In addition, three compartments were established in which every second row was cut. In three other compartments every third row was cut. These two treatments left about 64 and 85 square feet of basal area per acre, respectively.

Ten inches of wet snow accompanied by gusty winds fell on the stands on April 16-17, 1961. According to local weather station records, the snowfall equalled 1.19 inches of water. Of this, about 0.90 inches fell on the 16th. Temperatures during the 2-day period ranged from 29 to 37 degrees.

The frequency of tree damage decreased as the residual basal area increased for both cutting methods (fig. 1). The amount of damage tended to level off above 90 square feet in the compartments thinned from below where the basal area cut was relatively light. Roughly twice as many trees were damaged in the row-thinned compartments as in those thinned from below for comparable levels of basal area. In all treatments about 7 percent of the damaged trees had two or more types of injury.

The number of trees damaged per acre decreased slightly as the residual basal area increased, ranging from 145 trees per acre in the 30-square foot level to about 120 trees in the uncut portion of the stand. Approximately 200 trees per acre were damaged in the row-thinned plots. The exposed edges of the plantations, particularly those with openings to the south or west, apparently had more snow damage than the interior of the stand.

The types of damage--stem, limb, and root breakage or snow-bent stems--did not show a consistent relationship to the basal area of the compartments thinned from below (fig.2).

Stem breakage, occurring primarily in trees of average stand diameter and larger, accounted for about three-fifths of the damage to the residual stand. The point of breakage in the heavier thinnings appeared to be random along the stem at heights from 4 to 15 feet above the ground. Breakage occurred near the base of the crown in the lightly thinned and uncut plots. Less than 3 percent of the breakage occurred in the upper two-thirds of the crown.

Limb breakage, which occurred on the largest residual trees, was relatively minor in all treatments.

The percent of rootsprung and uprooted trees decreased with an increase in residual stand density and was confined to the larger diameter classes.

The proportion of snow-bent trees increased with residual basal area. Slightly more than half of these trees, primarily those of average stand diameter and smaller, were bent more than 40 degrees.

In the row-thinned plots stem breakage and uprooting, occurring in all size residual trees, accounted for about 90 percent of the damage. Stem breakage was highest where every third row was cut, causing nearly 60 percent of the total damage. Uprooting comprised nearly 50 percent of the damage where every second row was cut. Uprooting generally occurred in groups within the rows and in adjacent leave rows. Limb breakage was negligible under both thinning methods.

1/ Roe, E. I., and J. H. Stoeckeler. Thinning over-dense jack pine seedling stands in the Lake States. Jour. Forestry 48: 861-865, illus. 1950.

Snow damage tended to be light in unthinned jack pine and Scotch pine stands in the vicinity. A thinned red pine plantation of similar age and site quality was essentially uninjured during the same storm. Cutting methods and residual basal area levels were identical. This indicates a greater resistance of red pine to snow damage.

July 1962

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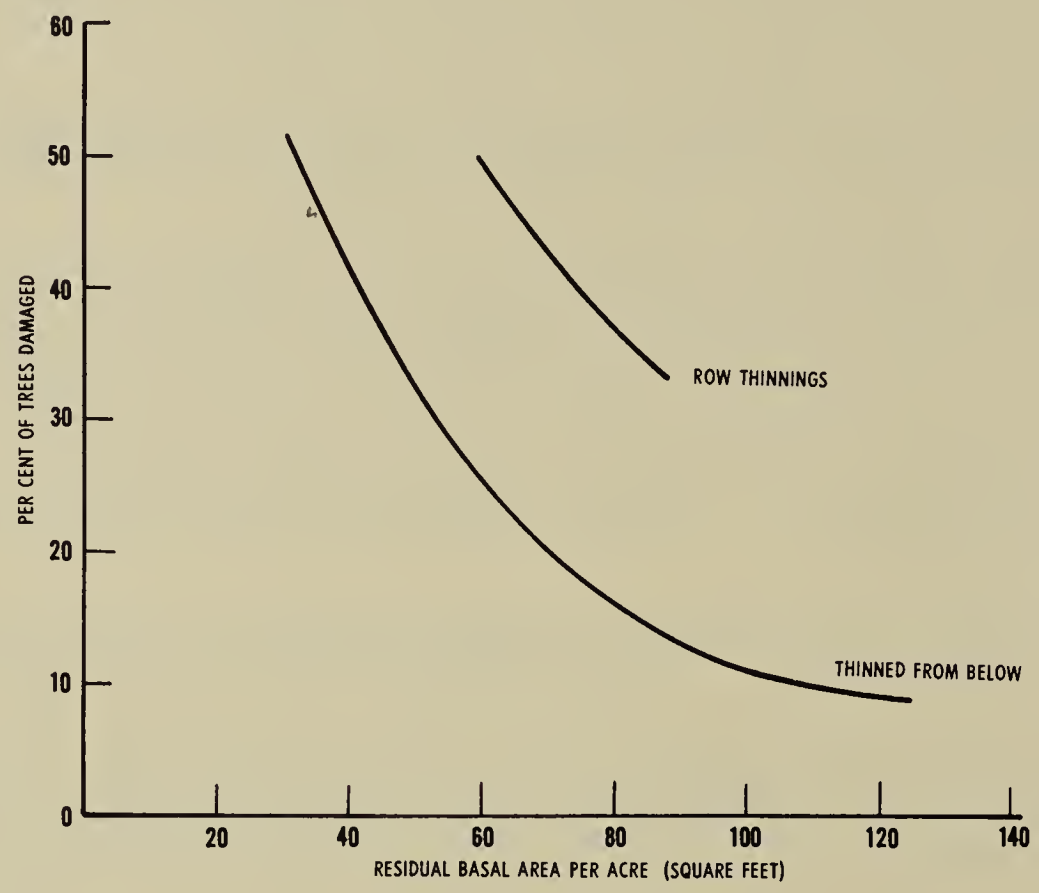

Figure 1.--Frequency of snow damage as related to residual stocking level and method of cutting in thinned jack pine plantations. Storm of April 16-17, 1961, Allegan State Forest.

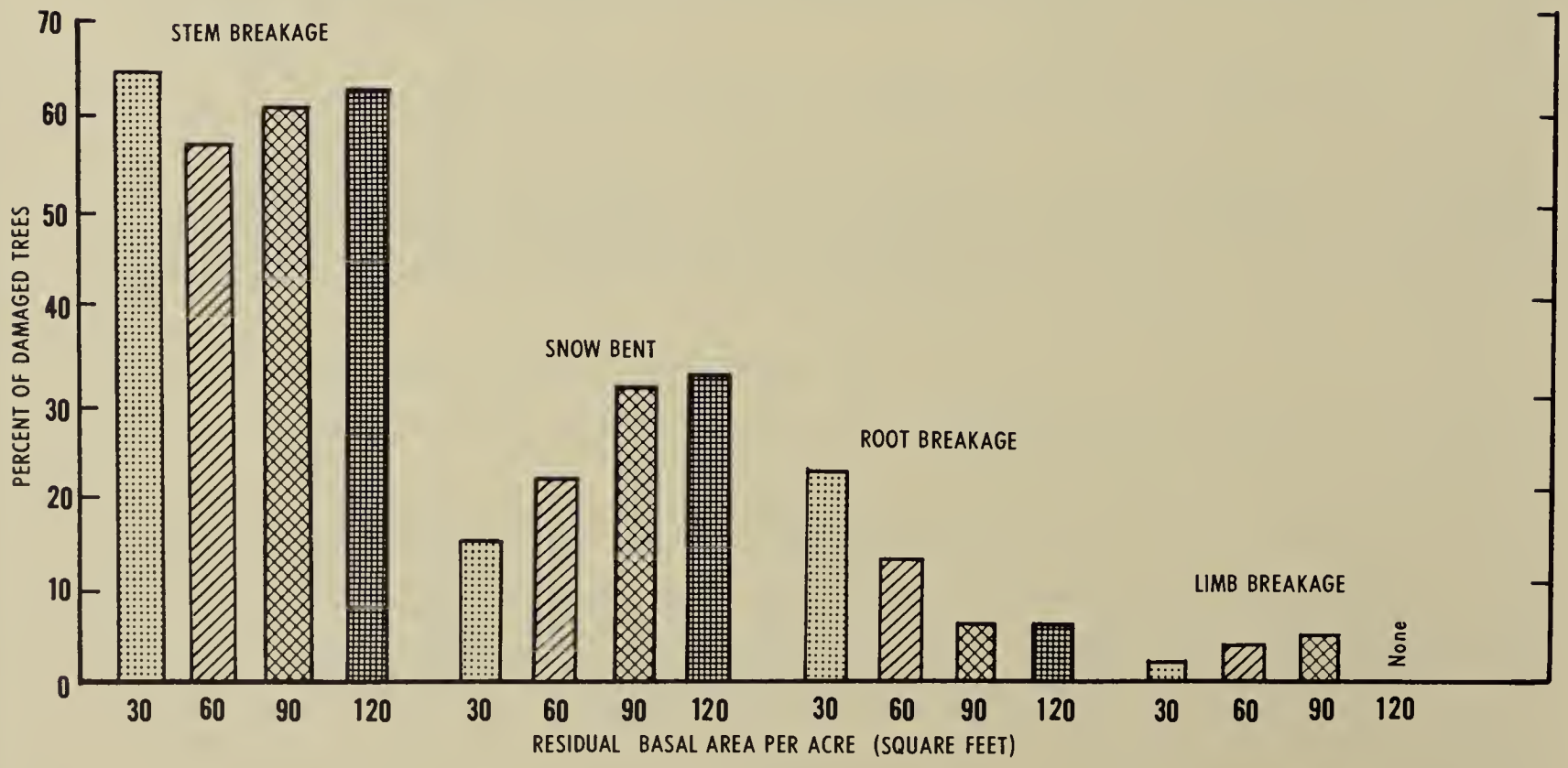

Figure 2.--Type of snow damage in jack pine plantations thinned from below, by residual basal area density. Some trees had two or more types of damage.